Small Business Innovation Research/Small Business Tech Transfer

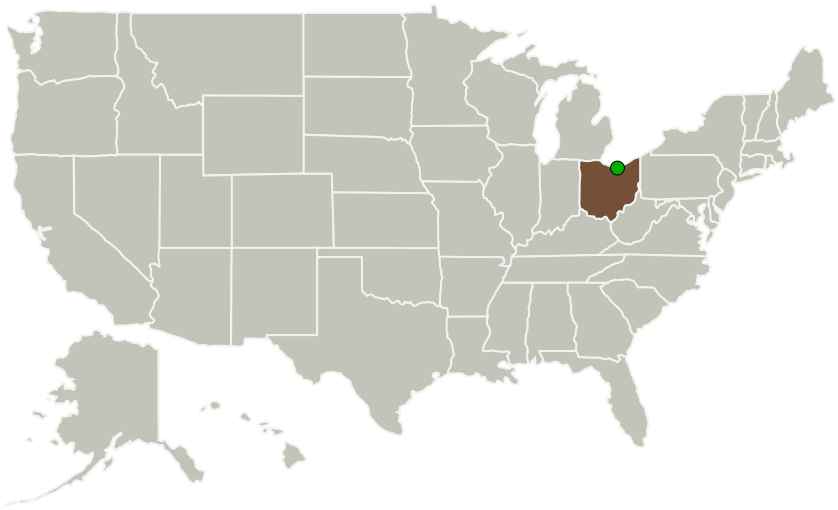
Multi Phase Flow Decomposition and Imaging Using Electrical Capacitance Volume Tomography Sensors, Phase I

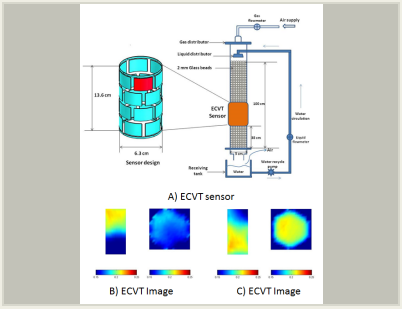
Completed Technology Project (2015 - 2015)

Project Introduction

The proposed innovation aims at using Electrical Capacitance Volume Tomography sensors (ECVT) for decomposing components of a multi-phase flow into separate phases, electronically. Here, each phase would be imaged and measured independently for accurate assessment of phase boundaries, phase velocity, and phase hold-up or distribution. This innovation is based on exploiting the dependence of electric properties of several materials on excitation frequency at which electrical capacitance is measured. Dielectric and conductivity values of liquids often undergo changes as the excitation frequency used in acquiring capacitance values is changed. For example, previous studies quantified the change in dielectric constant and dielectric loss of aqueous liquids, including de-ionized water, under different frequencies. Their findings show that such liquids often undergo significant changes in electrical properties with varying excitation frequencies. Typically, ECVT sensors are excited at frequencies in that range of tens of Khz to tens of Mh. At those frequency ranges, the electric properties of materials, especially those that contain water in multi-phase flow mixture, undergo significant changes.

Primary U.S. Work Locations and Key Partners





MULTI PHASE FLOW DECOMPOSITION AND IMAGING USING ELECTRICAL CAPACITANCE VOLUME TOMOGRAPHY SENSORS, Phase I

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Organizations Performing Work	Role	Type	Location
Tech4Imaging, LLC	Lead Organization	Industry	Columbus, Ohio
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations
Ohio

Project Transitions

June 2015: Project Start

December 2015: Closed out

Closeout Summary: MULTI PHASE FLOW DECOMPOSITION AND IMAGING USI NG ELECTRICAL CAPACITANCE VOLUME TOMOGRAPHY SENSORS, Phase I Proje ct Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/139129)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Tech4Imaging, LLC

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

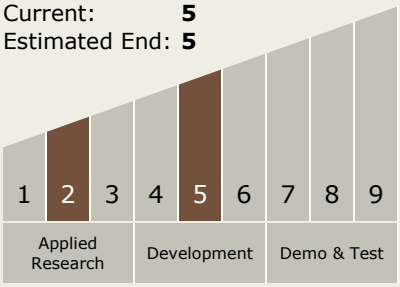
Carlos Torrez

Principal Investigator:

Qussai M Marashdeh

Technology Maturity (TRL)

Start: **2**
Current: **5**
Estimated End: **5**



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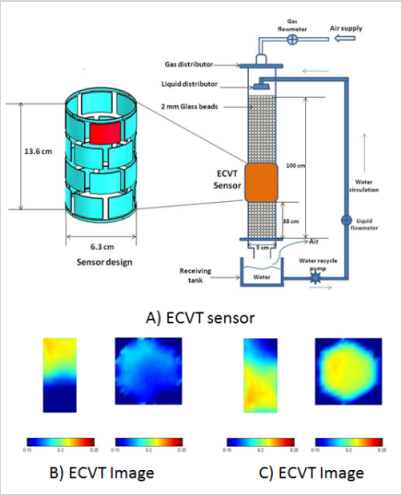
Images



Briefing Chart Image
MULTI PHASE FLOW DECOMPOSITION AND IMAGING USING ELECTRICAL CAPACITANCE VOLUME TOMOGRAPHY SENSORS, Phase I
(https://techport.nasa.gov/image/135752)

Technology Areas

Primary:

- TX06 Human Health, Life Support, and Habitation Systems
  - TX06.3 Human Health and Performance
    - TX06.3.6 Long Duration Health

Target Destinations

The Moon, Mars, Outside the Solar System, The Sun, Earth, Others Inside the Solar System